

## **REMARKS/ARGUMENTS**

This Amendment is responsive to the Office Action mailed December 19, 2003. The form of this Amendment is the Revised Amendment Format under 37 C.F.R. § 1.121 that became effective July 30, 2003.

### **Claim Rejections, 35 U.S.C. § 102(b)**

Claim 1 stands rejected as being anticipated by Collins et al. (U.S. 5,458,857) ("Collins").

Claim 1 has been amended to incorporate the limitation of claim 2 concerning the processor assembly and the presence of an oxidation core vessel containing an oxidation catalyst as an element of the processor assembly. No new matter is introduced by this amendment and support is found in the specification as filed and in original claim 2. Collins does not disclose a fuel processor comprising a processor assembly having multiple concentric vessels including an oxidation core vessel containing an oxidation catalyst. Although Collins discloses the use of combustion catalyst 429 within start-up tube 417, tube 417 is not concentrically arranged within the fuel processor assembly. Therefore, claim 1 is believed to be in condition for allowance.

The withdrawal of the rejection of claim 1 under 35 U.S.C. §102(b) as being anticipated by Collins is respectfully requested.

### **Claim Rejections, 35 U.S.C. § 103(a)**

Claim 13 is rejected under 35 U.S.C. § 103 as being unpatentable over Vartanian (4,943,493) in view of Janda et al. (5,927,063).

It is the position of the Office that Janda et al. ("Janda") discloses "a highly efficient hydrocarbon reformation apparatus and teaches that the efficiency can be improved greatly by pre-heating the fuel to be reformed", citing col. 1, lines 17-23. Furthermore, it is asserted that based upon such alleged teachings one skilled in the art would have been motivated to use the hot exhaust gases of Vartanian for preheating the hydrocarbon feed in order to improve the efficiency

of the apparatus as taught by Janda. Applicant respectfully disagrees with the Office's interpretation of the teachings of Janda and further with the assertion that one skilled in the art would have been motivated to combine the teachings of Vartanian and Janda in the manner suggested by the examiner.

Foremost, Janda discloses that "Regeneration (preheating the fuel)" increases the efficiency of a *power plant* (col. 1, lines 17-23). It should be noted that there is no teaching or suggestion in the cited text that preheating a reformer fuel will improve the efficiency of a hydrocarbon *reforming* apparatus or of the fuel reforming elements of the disclosed power generation apparatus.

Specifically, Janda discloses a power generation plant that uses methanol as a fuel. The methanol is pre-heated with gas turbine exhaust gases and is reformed with the reformed methanol being fed to gas turbine 41. The reformed methanol is combusted in gas turbine 41 and the turbine exhaust is used to heat the reforming reactor, to pre-heat the methanol fuel and to generate high pressure steam. The high pressure steam is fed to back pressure turbine 45 where it is converted to power and a lower pressure steam. See column 3, lines 25-58. As described in some detail, it is the use of back pressure turbine 45 in combination with gas turbine 41 that lowers the capital cost of the power generation plant (col. 4, lines 6-20) and increases the power generated (col. 4, lines 32-36), thus, improving the efficiency of the power plant. There is no teaching or suggestion in Janda that the incorporation of the back pressure turbine or the preheating of the methanol fuel results in any benefit or improvement in the hydrocarbon reforming elements of the disclosed power generation apparatus.

Moreover, because Janda teaches preheating a methanol fuel with turbine exhaust from a power generating gas turbine, it is unclear why one skilled in the art would have been motivated to incorporate an anode tail gas oxidizer into the power generation apparatus merely to provide heat for preheating the methanol fuel. The proposed incorporation of an anode tail gas oxidizer into such a power generation apparatus would provide a *redundant* source of heat for preheating the reforming fuel with added cost and complexity, and would not appear to

contribute to the ultimate purpose of the Janda apparatus, namely power generation. As such, one skilled in the art would *not* have been motivated to incorporate the hot anode tail oxidation (“ATO”) exhaust gases of Vartanian into the power generation apparatus of Janda in the manner suggested by the examiner.

It is also asserted that Janda teaches that hot exhaust gases can serve as a highly efficient heat exchange medium for preheating, citing col. 4, line 66 bridging to col. 5, line 3. Applicant notes that the referenced text constitutes claim 2 of the Janda patent. While Applicant does not dispute that the Janda discloses preheating a methanol fuel to be reformed with gas turbine exhaust, neither the claim nor the balance of the written description contains any statement concerning the *efficiency* of a reformer exhaust gas as a heat exchange medium or for improving the efficiency of a hydrocarbon reforming apparatus. As such, reliance on Janda for such a teaching would appear to be inappropriate.

Furthermore, it should also be noted that Janda does not teach a reforming module that produces a hydrogen rich gas that is *suitable for direct feed to a fuel cell* as is recited in Applicant’s claims. Janda discloses that the methanol fuel is catalytically converted to hydrogen and carbon monoxide and that these reformed products can be subjected to an equilibrium shift reaction to further the production of hydrogen (col. 2, lines 54-65). The hydrogen rich gas produced by the reformer taught in Janda is directly fed to the power-generating gas turbine as fuel for that turbine. The levels of carbon monoxide and other constituents that might otherwise be problematic when such a gas is fed to a fuel cell are not addressed in Janda. Applicant has amended claim 13 to recite that the hydrogen rich gas suitable for direct feed to a fuel cell contains carbon monoxide at a level below 50 ppm, which is described in Applicant’s specification as a level that will not poison the fuel cell catalyst. No new matter is introduced by this amendment and support may be found in the published specification, US 2002/0090328 A1, on page 3, paragraph [0029]. There is nothing in the disclosure of Janda that would teach or suggest that the reformed methanol that

is used to fuel the power-generating gas turbine is suitable for direct feed to a fuel cell, or more specifically, that the level of carbon monoxide in that reformed methanol is sufficiently low to render it suitable for direct feed to a fuel cell. Therefore, even if the ATO exhaust gases of Vartanian were to be incorporated into the power generating apparatus of Janda, the resulting apparatus would not be a compact fuel processor having a reforming module capable of producing a hydrogen-rich gas suitable for direct feed to a fuel cell as is recited in Applicant's amended claim 13.

In sum, Janda does not disclose that the efficiency of a hydrocarbon reforming apparatus can be improved by preheating the fuel to be reformed, nor does Janda disclose a reforming module capable of converting a hydrocarbon fuel feed to a hydrogen-rich gas suitable for direct feed to a fuel cell. As such, one skilled in the art would not have been motivated to have combined the teachings of Janda and Vartanian in the manner suggested by the Office. The withdrawal of the rejection of claim 13 under 35 U.S.C. § 103 as being unpatentable over Vartanian (4,943,493) in view of Janda et al. (5,927,063) is respectfully requested.

#### Allowable Subject Matter

Applicants extend their gratitude to the examiner and the Office for the comments concerning the allowable subject matter identified in original claims 2-12, 14-20, and claim 21.

It will be noted from a review of the listing of claims that Applicant has amended claim 2 to remove the limitations concerning the desulfurization vessel, the shift vessel and the preferred oxidation vessel. These limitations have been presented in new claims 22, 23 and 24 respectively. No new matter has been introduced by these amendments and support may be found in original claim 2. Furthermore, neither the amendment of claim 2 nor the introduction of new claims 22-24 should be construed as narrowing the scope of the claimed subject matter.

Claims 3, 5, 6, 8, 9, and 12 have been amended to correct dependency.

Claim 14 has been amended to remove the limitation concerning the first heat exchanger coil. This limitation has been presented in new claim 25. No new matter has been introduced by this amendment and support may be found in original claim 14. Furthermore, neither the amendment of claim 14 nor the introduction of new claim 25 should be construed as narrowing the scope of the claimed subject matter.

Claim 16 has been amended to remove the limitations concerning the heat exchange coil, the shift vessel and the preferred oxidation vessel. These limitations have been presented in new claims 26, 27, and 28 respectively. In addition, claim 16 has been amended to remove the limitation concerning the order in which the third preheated hydrocarbon fuel is introduced through the reforming module. This limitation has been presented in new claim 29. No new matter has been introduced by these amendments and support may be found in original claim 16. Furthermore, neither the amendment of claim 16 nor the introduction of new claims 26-29 should be construed as narrowing the scope of the claimed subject matter.

Claim 19 has been amended to correct its dependency.

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All of the stated grounds of objection and rejection are believed to have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicant believes that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment is respectfully requested.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Frank C. Turner", is written over a horizontal line.

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